

**CAUVERY COLLEGE FOR WOMEN
(AUTONOMOUS)**

**Nationally Accredited with 'A' Grade by NAAC
ISO 9001:2015 Certified
TIRUCHIRAPPALLI**

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE



B.Sc. COMPUTER SCIENCE

SYLLABUS

2023 -2024 and Onwards

CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)
PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

VISION

To create an ambience for a quality academic erudition which drives technologically adept, innovative and globally competent graduates with ethical values

MISSION

- To have a breadth of knowledge across the subject areas of Computer Science
- To professionally enrich the students for successful career in Academia, Industry and Research
- To promote and inculcate ethics and code of professional practice among students

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOs	Statements
PEO1	LEARNING ENVIRONMENT To facilitate value-based holistic and comprehensive learning by integrating innovative learning practices to match the highest quality standards and train the students to be effective leaders in their chosen fields.
PEO2	ACADEMIC EXCELLENCE To provide a conducive environment to unleash their hidden talents and to nurture the spirit of critical thinking and encourage them to achieve their goal.
PEO3	EMPLOYABILITY To equip students with the required skills in order to adapt to the changing global scenario and gain access to versatile career opportunities in multidisciplinary domains.
PEO4	PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY To develop a sense of social responsibility by formulating ethics and equity to transform students into committed professionals with a strong attitude towards the development of the nation.
PEO5	GREEN SUSTAINABILITY To understand the impact of professional solutions in societal and environmental contexts and demonstrate the knowledge for an overall sustainable development.

PROGRAMME OUTCOMES FOR B.Sc. Computer Science,

B.Sc. Computer Science with Cognitive Systems, BCA,

B.Sc. Information Technology

PO NO.	On completion of B. Sc Computer Science / B. Sc Computer Science with Cognitive Systems / BCA/ B. Sc Information Technology Programme, the students will be able to
PO 1	ACADEMIC SKILLS & SOCIAL RESPONSIBILITY Apply Computing, Mathematical and Scientific Knowledge in Various disciplines by understanding the concerns of the society.
PO 2	CRITICAL THINKING AND INNOVATIVE PROGRESS Design the software applications with varying intricacies using programming languages for innovative learning in techno world to meet the changing demands.
PO 3	PERSONALITY DEVELOPMENT Perceive Leadership skills to accomplish a common goal with effective communication and understanding of professional, ethical, and social responsibilities.
PO 4	LIFELONG LEARNING Identify resources for professional development and apply the skills and tools necessary for computing practice to gain real life experiences.
PO 5	CREATIVITY AND HOLISTIC APPROACH Create a scientific temperament and novelties of ideas to support research and development in Computer Science to uphold scientific integrity and objectivity.

PROGRAMME SPECIFIC OUTCOMES FOR B.Sc. COMPUTER SCIENCE

PSO NO.	The students of B.Sc. Computer Science will be able to	POs Addressed
PSO 1	Identify, analyze, design an optimized solution using appropriate algorithms of varying complexity using cutting edge technologies	PO 1 PO 2 PO 5
PSO 2	Attain a solid foundation in the Programming languages and to formulate computational solutions to real life problems	PO 1 PO 2 PO 4 PO 5
PSO 3	Equip the skills to utilize tools and technologies in computer science to meet the industrial needs and to communicate effectively among peers	PO 3 PO 4
PSO 4	Develop skills in software and hardware so as to enable them to establish a productive career in industry, research, academia and also as an entrepreneur	PO 1 PO 4 PO 5
PSO 5	Implement independent projects of their own choice using latest tools and also work as an effective team member to attain the predefined goals.	PO 3 PO 4 PO 5



Cauvery College for Women(Autonomous), Trichy

PG & Research Department of Computer Science

B.Sc Computer Science

LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK(CBCS – LOCF)

(For the Candidates admitted from the Academic year 2023-2024 and onwards)

Semester	Part	Course	Course Title	Course Code	Inst. Hrs. / week	Credits	Exam			Total	
							Hrs.	Marks			
								Int	Ext		
I	I	Language Course-I (LC)	பொதுத்தமிழ்- I	23ULT1	6	3	3	25	75	100	
			Hindi ka Samanya Gyan aur Nibandh	23ULH1							
			Poetry, Grammar and History of Sanskrit Literature	23ULS1							
			Foundation Course:Paper I - French I	23ULF1							
	II	English Language Course -I (ELC)	General English -I	23UE1	6	3	3	25	75	100	
	III	Core Course – I (CC)	Python Programming	23UCS1CC1	5	5	3	25	75	100	
		Core Practical - I (CP)	Python Programming(P)	23UCS1CC1P	3	3	3	40	60	100	
		First Allied Course- I (AC)	Numerical Methods	23UCS1AC1	4	3	3	25	75	100	
		First Allied Course- II (AC)	Graph Theory and its Applications	23UCS1AC2	4	3	3	25	75	100	
		IV	Ability Enhancement Compulsory Course-I (AECC)	UGC Jeevan Kaushal- Value Education	23UGVE	2	2	-	100	-	100
	Total				30	22				700	
II	I	Language Course-II (LC)	பொதுத்தமிழ்- II	23ULT2	6	3	3	25	75	100	
			Hindi Literature & Grammar - II	22ULH2							
			Prose, Grammar and History of Sanskrit Literature	23ULS2							
			Basic French - II	22ULF2							
	II	English Language Course –II (ELC)	General English- II	23UE2	6	3	3	25	75	100	
	III	Core Course – II (CC)	Programming in Java	22UCS2CC2	5	5	3	25	75	100	
		Core Practical - II (CP)	Java Programming (P)	22UCS2CC2P	3	3	3	40	60	100	
		Core Practical -III (CP)	Data Visualization (P)	23UCS2CC3P	2	2	3	40	60	100	
		First Allied Course – III (AC)	Operations Research	22UCS2AC3	4	3	3	25	75	100	
	IV	Ability Enhancement Compulsory Course-II (AECC)	Environmental Studies	22UGEVS	2	2	-	100	-	100	
		Ability Enhancement Compulsory Course-III (AECC)	Innovation and Entrepreneurship	22UGIE	2	1	-	100	-	100	
	SWAYAM				As per UGC Recommendation						
	Total					30	22				800

The Internal and External marks for theory and practical courses are as follows:

Course	Internal Marks	External Marks
Theory	25	75
Practical	40	60

For Theory Courses:

- a) The passing minimum for CIA shall be 40% out of 25 marks (i.e. 10 marks)
- b) The passing minimum for End Semester Examinations shall be 40% out of 75 marks (i.e. 30 marks)

For Practical Courses:

- a) The passing minimum for CIA shall be 40% out of 40 marks(i.e. 16 marks)
- b) The passing minimum for End Semester Examinations shall be 40%out of 60 marks (i.e. 24 marks)

Semester I	Internal Marks:25		External Marks: 75	
COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
23UCA1CC1 / 23UCS1CC1	PYTHON PROGRAMMING	CORE	5	5

Course Objectives

- To make students understand the concepts of Python programming
- To apply the OOPs concept in Python programming
- To make the students learn best practices in Python programming

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Recall the fundamental concepts of Python	K1
CO2	Demonstrate the problem-solving approach using Python statements	K2
CO3	Construct the Python programme using functions and modules	K3
CO4	Analyze the Python programming concepts to develop programs	K4
CO5	Develop a Python program to solve real time problems	K5

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	1	1	3	3	2	3	2
CO2	3	2	3	1	1	3	2	2	3	3
CO3	3	3	3	2	2	3	3	2	3	2
CO4	3	2	3	2	2	3	3	2	3	2
CO5	3	3	3	2	2	3	3	2	2	3

“1”-Slight (Low) Correlation

“3” –Substantial (High) Correlation

“2”-Moderate (Medium) Correlation

“-” - Indicates there is no Correlation

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	Basics of Python Programming: Features of Python -History of Python- Literal Constants-Variables and Identifiers–Data Types- Input Operation- Comments–Reserved Words- Indentation- Operators and Expressions –Other Data Types- Type Conversion.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	Decision Control Statements: Selection/Conditional Branching statements: if, if-else, nested if and if-elif-else statements. Basic Loop Structures / Iterative Statements: while loop, for loop- Nested Loops- The break Statement- The continue Statement.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	Functions and Modules: Function Definition – Function Call: Function Parameters – Variable Scope and Lifetime: Local and Global Variables-Using the Global Statement-Resolution of Names. The return Statement. More on Defining Functions: Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments. Python Strings: Strings are Immutable- Built-in String Methods and Functions – Comparing Strings. Modules: The from...import statement- Name of Module – The dir() function – Modules and Namespace.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	Lists: Access values in List-Updating values in Lists- Nested lists -Basic list operations-List Methods. Tuple: Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples. Dictionaries: Creating a dictionary, Accessing values, Modifying an Entry -Deleting items – Built-in Dictionary Functions and Methods - Difference between a List and a Dictionary.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	File Handling: Types of files in Python - Opening and Closing files- Reading and Writing files: write() and writelines() methods- append() method – read() and readlines() methods – Splitting words –File Positions.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	Self Study for Enrichment (Not to be included for End Semester Examination) Difference between lists and tuples - Defining our own modules- Renaming and deleting files.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Book

1. Reema Thareja. (2017), Python Programming using problem solving approach, 1st Edition, Oxford University Press.

References

1. Dr. R. Nageswara Rao. (2017), Core Python Programming, 1st Edition, Dream tech Publishers.
2. VamsiKurama. (2017), Python Programming: A Modern Approach, 1st Edition, Pearson Education.
3. Mark Lutz. (2013), Learning Python, Fifth Edition, Orielly.
4. Adam Stewarts. (2017), Python Programming, Online.
5. Fabio Nelli. (2015), Python Data Analytics, 1st Edition, APress.
6. Kenneth A. Lambert. (2019), Fundamentals of Python – First Programs, 2nd Edition, CENGAGE Publication.

Web References

1. <https://www.programiz.com/python-programming>
2. <https://www.guru99.com/python-tutorials.html>
3. https://www.w3schools.com/python/python_intro.asp
4. <https://www.geeksforgeeks.org/python-programming-language/>
5. [https://en.wikipedia.org/wiki/Python_\(programming_language\)](https://en.wikipedia.org/wiki/Python_(programming_language))

Pedagogy

Chalk & Talk, PowerPoint Presentation, Discussion, Assignment, Demo, Quiz and Seminar

Course Designer

Dr.K.Akila , Associate Professor, Department of Computer Applications

Semester I	Internal Marks:40		External Marks:60	
COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
23UCS1CC1P	PYTHON PROGRAMMING (P)	CORE	3	3

Course Objective

- Acquire programming skills in core Python.
- Implement Object-Oriented Programming skills in Python.
- Use functions and represent Compound data using Lists, Tuples and Dictionaries.
- Develop the skill of designing Graphical-User Interfaces (GUI) in Python.

Course Outcomes and Cognitive Level Mapping

CO Number	CO Statement	Cognitive Level
CO1	Understand the problem-solving approaches	K2
CO2	Identify suitable programming constructs for problem solving.	K3
CO3	Analyze various concepts of Python language to solve the problem in an efficient way.	K4
CO4	Examine the various Python programming techniques.	K5
CO5	Develop a python program for a given problem and test for its Correctness.	K6

Mapping of CO with PO and PSO

Cos	PSO1	PSO2	PSO3	PSO4	PSO5	PO 1	PO 2	PO 3	PO 4	PO 5
CO1	2	3	3	1	3	3	3	3	3	3
CO2	3	3	3	3	3	2	3	3	3	3
CO3	3	3	3	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	3	1	3	3
CO5	3	3	3	3	3	3	3	2	3	3

“1”–Slight (Low) Correlation

“3”–Substantial (High) Correlation

“2”–Moderate (Medium) Correlation

“-”indicates there is no Correlation.

List of Exercises

1. Program using variables, constants and I/O statements.
2. Program using Operators.
3. Program using Conditional Statements.
4. Program using Loops.
5. Program using Jump Statements.
6. Program using Functions and Recursion.
7. Program using Arrays.
8. Program using Strings.
9. Program using Modules.
10. Program using Lists.
11. Program using Tuples.
12. Program using Dictionaries.
13. Program for File Handling.

Web References

1. <https://www.w3resource.com/python-exercises/>
2. <https://www.programiz.com/python-programming/online-compiler/>
3. <http://www.w3schools.in/python/>
4. <https://studyglance.in/>

Pedagogy

Power Point Presentations, Demo by e-Contents

Course Designer

Ms.R.Ramya

FIRST ALLIED COURSE – I

NUMERICAL METHODS

(For B.Sc Computer Science, BCA, Information Technology & Computer Science with Cognitive Systems)

(2023 – 2024 ONWARDS)

Semester I	Internal Marks:25		External Marks:75	
COURSE CODE	COURSE TITLE	CATEGORY	HOURS/ WEEK	CREDITS
23UCG1AC1/ 23UCS1AC1/ 23UCA1AC1/ 23UIT1AC1	NUMERICAL METHODS	ALLIED	4	3

Course Objective

- **Learn** the various topics in Numerical methods.
- **Understand** the fundamentals of algebraic equations, interpolation, numerical differentiation and integration.
- **Develop** skills in solving problems of numerical techniques.

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement	Cognitive Level
	On the successful completion of the course, students will be able to	
CO1	Remember the basic concepts of numerical methods.	K1
CO2	Illustrate the various notions of computational numerical streams.	K2
CO3	Apply the different techniques of numerical problems	K3
CO4	Classify the methods of numerical techniques.	K4
CO5	Examine the solutions of numerical problems.	K4

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	3	3	3	3	2	3
CO2	3	2	3	3	3	3	3	3	3	2
CO3	3	2	3	3	3	3	3	3	2	2
CO4	3	2	2	3	3	3	3	3	3	2
CO5	3	2	3	3	3	3	3	3	2	2

“1” – Slight (Low) Correlation

“2” – Moderate (Medium) Correlation

“3” – Substantial (High) Correlation

“-” indicates there is no correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	Solution of Algebraic and Transcendental Equations: Introduction – Bisection Method – The Iteration Method – The Method of False Position – Newton Raphson Method. (Simple Problems Only).	12	CO1, CO2, CO3, CO4, CO5	K1 K2, K3, K4
II	Interpolation: Finite differences – Forward differences – Backward differences – Central differences – Newton's Formulae for interpolation–Interpolation with Unevenly Spaced Points – Lagrange's Interpolation Formula. (Simple Problems Only)	12	CO1, CO2, CO3, CO4, CO5	K1 K2, K3, K4
III	Numerical Differentiation and Integration: Introduction – Numerical Differentiation – Numerical Integration – Trapezoidal Rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule (Simple Problems Only)	12	CO1, CO2, CO3, CO4, CO5	K1 K2, K3, K4
IV	Numerical Linear Algebra: Solution of Linear Systems – Direct Methods – Gauss - Elimination – Gauss -Jordan method. Solution of Linear Systems – Iterative Methods. (Simple Problems Only)	12	CO1, CO2, CO3, CO4, CO5	K1 K2, K3, K4
V	Numerical Solution of Ordinary Differential Equations: Introduction – Solution by Taylor's Series – Euler's Method – Modified Euler's Method – Runge-Kutta Method–Predictor-Corrector Methods – Adams-Moulton Method – Milne's Method(Simple Problems Only)	12	CO1, CO2, CO3, CO4, CO5	K1 K2, K3, K4
VI	Self-Study for Enrichment (Not included for End Semester Examination) Ramanujan's Method – Bessel's Formula – Newton-Cotes Integration Formulae –The QR Method – Picard's Method of Successive Approximations	-	CO1, CO2, CO3, CO4, CO5	K1 K2, K3, K4

Text Book

Sastry.S.S (2004), *Introductory Methods of Numerical Analysis* (Third Edition), Prentice Hall of India Private Ltd, New Delhi.

Chapters and Sections

- UNIT-I Chapter 2: Sections: 2.1 – 2.5 (Omit 2.3.1 & 2.5.1)
- UNIT II Chapter 3: Sections: 3.3 : 3.3.1 – 3.3.3, 3.6, 3.9 : 3.9.1
- UNIT-III Chapter 5: Sections: 5.1, 5.2 (only), 5.4 : 5.4.1 – 5.4.3
- UNIT-IV Chapter 6: Sections: 6.3: 6.3.2, 6.4
- UNIT-V Chapter 7: Sections: 7.1,7.2, 7.4: 7.4.2, 7.5,7.6

Reference Books

1. Venkataraman, M.K. (2003). *Numerical Methods in Science and Engineering*, The National Publishing Company.
2. Iyengar S.R.K, Jain R.K, (2009). *Numerical Methods*, New Age International Publishers.
3. Subramanian,N. (2007). *Numerical Methods*, SCM Publisher, Erode.

Web References

1. <https://tinyurl.com/4y7knvm9>
2. <https://tinyurl.com/t29njcy5>
3. <https://www.youtube.com/watch?v=TIWRyzzFUYQ>
4. <https://www.youtube.com/watch?v=ivjiGB5vxLA>
5. https://www.youtube.com/watch?v=j_4MVZ3VADU

Pedagogy

Assignment, Seminar, Lecture, Quiz, Group discussion, Brain storming, e-content.

Course Designer

1. Dr. V. Geetha
2. Dr. S. Sasikala

FIRST ALLIED COURSE - II
GRAPH THEORY AND ITS APPLICATIONS
(2023-2024 and Onwards)

Semester I	Internal Marks: 25		External Marks:75	
COURSE CODE	COURSE TITLE	CATEGORY	HOURS / WEEK	CREDITS
23UCS1AC2/ 23UIT1AC2	GRAPH THEORY AND ITS APPLICATIONS	ALLIED	4	3

Course Objective

- **Introduce** the notion of graph theory and its application.
- **Understand** the fundamental concepts in graph theory.
- **Explore** some of the most important notions of graph theory and develop their skills and solving basic exercise.

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement	Cognitive Level
	On the successful completion of the course, students will be able to	
CO1	Define basic definitions of graphs.	K1
CO2	Describe the concepts and Characterization of Graphs.	K2
CO3	Explain the notion of Spanning Trees.	K2
CO4	Compute the properties of Planar Graphs.	K3
CO5	Analyze the concept of graphs in Matrix Representation.	K4

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3	3	3	2	2	3
CO2	3	2	3	3	3	3	3	3	2	3
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	2	3	3	2	3	3	2	2	3
CO5	3	2	3	3	2	3	3	3	3	2

“1” – Slight (Low) Correlation “2” – Moderate (Medium) Correlation
“3” – Substantial (High) Correlation “-” indicates there is no correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	INTRODUCTION: Definition of a Graph – Application of Graphs – Finite and Infinite Graphs – Incidence and Degree – Isolated Vertex, Pendant Vertex and Null Graph. PATHS AND CIRCUITS: Isomorphism – Subgraphs – Walks, Paths and Circuits – Connected Graphs, Disconnected Graphs and Components.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
II	PATHS AND CIRCUITS: Euler Graphs – Operation on Graphs – More on Euler Graphs – Hamiltonian Paths and Circuits – The Traveling Salesman Problem.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
III	TREES AND FUNDAMENTAL CIRCUITS: Trees – Some Properties of Trees – Pendant Vertices in a Tree – Distance and Centers in a Tree – Rooted and Binary Trees – On Counting Trees – Spanning Trees.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
IV	CUT - SETS AND CUT - VERTICES: Cut-Sets – Some Properties of a Cut-Set – All Cut-Sets in a Graph – Fundamental Circuits and Cut-Sets – Connectivity and Separability.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
V	PLANAR GRAPHS: Planar Graphs – Kuratowski's Two Graphs – Different Representations of a Planar Graph. MATRIX REPRESENTATION OF GRAPHS: Incidence Matrix – Submatrices of $A(G)$ – Circuit Matrix.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
VI	Self Study for Enrichment: (Not included for End Semester Examination) Brief History of Graph Theory – A Puzzle with Multicolored Cubes – Finding All Spanning Trees of a Graph – Network Flows – Combinatorial Vs. Geometric Graphs – An Application to a switching network.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

Text Book

1. Narsingh Deo, “*Graph Theory with Application to Engineering and Computer Science*”
Prentice Hall of India 2010(Reprint).

Chapters and Sections

UNIT-I	Chapter 1: Sections 1.1 – 1.5 Chapter 2: Sections 2.1, 2.2, 2.4, 2.5
UNIT-II	Chapter 2: Sections 2.6 – 2.10
UNIT-III	Chapter 3: Sections 3.1 – 3.7
UNIT- IV	Chapter 4: Sections 4.1 – 4.5
UNIT- V	Chapter 5: Sections 5.2 – 5.4 Chapter 7: Sections 7.1 – 7.3

Reference Books

1. Arumugam S and Ravichandran S, “Invitation to Graph Theory”, Scitech Publications(India) Private Limited.
2. Gary Chartrand and Ping Zhang, “Introduction to Graph Theory”, Tata McGraw-Hill Edition, 2004.

Web References

1. <https://youtu.be/S1Zwhz-Mhcs>
2. <https://youtu.be/R5LZIpz-oIE>
3. https://youtu.be/X2B_J1ajsIY
4. <https://youtu.be/5M7bOXrn54A>
5. <https://youtu.be/QwX1ncB13B0>

Pedagogy

Power point presentations, Group Discussions, Seminar, Quiz, Assignment.

Course Designer

Dr. P. SHALINI

Semester II	Internal Marks: 25		External Marks: 75	
COURSE CODE	COURSE TITLE	CATEGORY	HOURS/ WEEK	CREDITS
22UCS2CC2/ 22UCA2CC2	PROGRAMMING IN JAVA	CORE	5	5

Course Objectives

- To develop logics which will help them to create programs
- To get a deep knowledge of programming using JAVA language
- To understand the basics of OOPs concepts
- Enhance problem solving skill

Course Outcomes and Cognitive Level Mapping

On the successful completion of the course, the students will be able to

CO Number	CO Statement	Cognitive Level
CO1	Recite the basic programming skills	K1
CO2	Understand the Java features	K2
CO3	Analyze OOPs concepts	K4
CO4	Apply the programming skills in various domains	K3
CO5	Solve real time problems using Java	K5

Mapping of CO with PO and PSO

CO s	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5
CO1	2	3	2	1	1	2	2	2	2	2
CO2	3	2	3	1	1	3	3	2	3	2
CO3	3	3	3	2	2	3	3	2	3	2
CO4	3	2	3	2	2	3	3	2	3	2
CO5	3	3	3	2	2	3	3	2	2	3

“1” – Slight (Low) Correlation

“3” – Substantial (High) Correlation

“2” – Moderate (Medium) Correlation

“-” indicates there is no correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	Fundamentals of Object-Oriented Programming: Basic Concepts of Object-Oriented Programming - Benefits and Applications of OOP. Java Evolution: Java Features - Java Environment - Overview of Java Language: Java Program Structures, Statements – Implementing A Java Program – Java Virtual Machine –. Constants, Variables and Data Types: Constants- Variables – Data Types – Declaration of Variables – Giving Values to Variables – Scope of Variables – Symbolic Constants- Type Casting- Getting Values of Variables.	15	CO1, CO2, CO3	K1, K2, K3, K4
II	Operators and Expressions: Introduction - Arithmetic Operators- Relational Operator - Logical Operator - Assignment Operator-increment and decrement Operator-Conditional Operator - Bitwise Operator- Special Operator - Decision Making and Branching: Introduction - Decision making with if statement-Simple if statement -The if ..else Statement- Nesting of if ...else statements- The switch statement - The Conditional Operator(?:Operator) - Decision Making and Looping : While, Do, For Statement, Jump In Loops, Return Statement.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	Classes, Objects and Methods: Defining A Class – Fields and Methods Declaration - Creating Objects – Accessing Class Members – Constructors – Method Overloading – Static Members – Nesting of Methods – Inheritance: Extending A Class – Overriding Methods – Final Variables, Methods and Classes – Abstract Methods and Classes – Visibility Control. Arrays, Strings and Vectors: Creating Arrays – One and two Dimensional Arrays Strings – Vectors. Interfaces: Multiple Inheritance: Introduction - Defining Interfaces - Extending Interfaces- Implementation Interfaces - Accessing Interfaces Variables.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	Packages: Introduction - Java Packages - Using System Packages- Naming conventions - Creating packages - Accessing a package - Using a Package - Adding a class to a package - Multithreaded Programming: Creating Threads – Extending the Thread Class – Thread- Life Cycle of Thread-Using Thread Method-Thread Priority – Synchronization – Managing Errors and Exceptions: Introduction - Types of Errors -Exceptions-Syntax of Exception Handling code-Multiple Catch Statements.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	Graphics Programming using AWT, Swing and Layout Manager: The Graphics Class- Lines and Rectangles- Circles and Ellipses-Drawing Arcs - Drawing Polygons – Introduction to AWT Package – Window Fundamentals – Layout Managers – Introduction to Swing Package – Components and Containers – AWT versus Swing - Database Connectivity: Introduction – JDBC Architecture – Discussion with Example – Overview of JDBC Components.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

VI	UNIT VI - Self Study for Enrichment (Not to be included for External Examination) Comment Line Arguments – Enumerated Types - Finalizer Methods - Applet Programming: Building Applet Code - Applet Life Cycle - Creating and Executable Applet – Designing a Web Page using Applet – Managing Input/Output Files in Java: Stream Classes – Byte Stream Classes – Character Stream Classes – Creation of Files – Reading/Writing Characters – Reading/Writing bytes.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
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Text Book

E. Balagurusamy,(2019). "*Programming with JAVA*", 6th Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi.

Reference Books

1. S.Sagayaraj, R.Denis, P.Karthik and D.Gajalakshmi,(2017)."*Java programming*", Universities Press.
2. Schildt Herbert,(2011)."*Java :The Complete Reference*", 8th Edition Tata McGraw-Hill.
3. C.Muthu, (2008)."*Programming with JAVA*", Second Edition, McGraw Hill Education
4. Ken Arnold gosling and Davis Holmen,(2005). "*The JAVA Programming Language*",4th Edition, Addison Wesley Pearson Education Publication.

Web References

1. <https://www.javatpoint.com/java-tutorial>
2. <https://www.guru99.com/java-tutorial.html>
3. <https://www.w3schools.com/java/>

Pedagogy

Chalk and Talk, PPT, Discussion, Assignment, Demo, Quiz and Seminar.

Course Designer

Ms. A. Jabeen, Assistant Professor, Department of Computer Applications.

Semester II	Internal Marks:40		External Marks:60	
COURSE CODE	COURSE TITLE	CATEGORY	HOURS/WEEK	CREDITS
22UCS2CC2P	JAVA PROGRAMMING (P)	CORE	3	3

Course Objective

- To demonstrate the basic programming components of Java
- To learn how to apply the object oriented concepts in Java to develop stand-alone applications
- To design and develop GUI applications with appropriate database connectivity

Course Outcomes and Cognitive Level Mapping

On the successful completion of the course, the students will be able to

CO Number	CO Statement	Cognitive Level
CO1	Demonstrate and Implement the fundamentals of Java programming concepts	K2, K3
CO2	Analyze the problem and develop skills on identifying appropriate Programming constructs like looping, branching and functions	K3, K4
CO3	Examine the problem and create a reusable program by combining the features of Java such as Classes, Objects, Packages, Interfaces and Exception handling	K4, K6
CO4	Analyze the complexity of problem in real world and design an event driven and web based interactive programs using Applets	K4, K6
CO5	Build applications with database connectivity to mimic the real world scenarios	K6

Mapping of CO with PO and PSO

CO s	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	2	2	2	3	2	3	3
CO2	3	3	3	3	3	2	3	2	3	3
CO3	3	3	3	3	3	2	3	3	3	3
CO4	3	3	3	3	3	2	3	2	3	3
CO5	3	3	3	3	3	2	3	3	3	3

“1”-Slight (Low) Correlation

“3”-Substantial (High) Correlation

“2”-Moderate (Medium) Correlation

“-”-indicates there is no Correlation.

List of Exercises:

1. Class and Objects
2. Decision Making using Control Statements and Loop Statements
3. Method Overloading and Method Overriding
4. Inheritance
5. Interface
6. Package
7. Multithread
8. Exception Handling
9. GUI using Swing
10. Database Connectivity using JDBC

Web References:

1. <http://docs.oracle.com/javase/tutorial/java/>
2. <http://www.java2s.com/Tutorial/Java/CatalogJava.htm>
3. <http://www.javatpoint.com/java-swing>
4. <http://way2java.com/java-versions-2/jdk-1-8-features/>
5. <https://www.w3schools.com/java/>
6. <https://www.tutorialspoint.com/java/>

Pedagogy:

Power Point Presentations, Demo by e-Contents tutorials

Course Designer:

Ms.N.Girubagari

Semester II	Internal Marks:40		External Marks:60	
COURSE CODE	COURSE TITLE	CATEGORY	HOURS /WEEK	CREDITS
23UCS2CC3P	DATA VISUALIZATION (P)	CORE	2	2

Course Objective

- To perform basic calculations and formatting on Data
- To expose the visual representation methods and techniques that increase the understanding of complex data
- To gain knowledge in good design practices for visualization of data

Course Outcomes and Cognitive Level Mapping

On the successful completion of the course, the students will be able to

CO Number	CO Statement	Cognitive Level
CO1	Demonstrate the use of basic Functions, Methods and Formatting	K2
CO2	Identify the different Models for data analysis	K3
CO3	Analyze the data using Graph Function	K4
CO4	Construct the data analysis report with proper validation	K5
CO5	Build Dashboard for data visualization	K6

Mapping of CO with PO and PSO

CO s	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5
CO1	3	3	3	2	3	2	3	1	3	3
CO2	3	3	3	3	3	3	3	2	3	3
CO3	3	3	3	2	3	2	3	1	3	3
CO4	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3

“1”–Slight (Low) Correlation

“3”–Substantial (High) Correlation

“2”–Moderate (Medium)Correlation

“-” indicates there is no Correlation.

List of Exercises:

1. Using Microsoft Excel
 - a. Creation and Formatting
 - b. Functions and Formulas
 - c. Graphs
 - d. Lookup and Reference Functions
 - e. Data Validation
 - f. Pivot table
 - g. Data analysis report generation
 - h. Working with multiple worksheets
2. Using Power BI
 - a. Basic Reports
 - b. Filtering Data
 - c. Charts
 - d. Book marks
 - e. Dashboard Creation
 - f. Data Visualization

Web References:

1. https://www.tutorialspoint.com/excel_data_analysis/index.htm
2. <https://www.udemy.com/course/data-visualization-in-excel-for-business-professionals/>
3. <https://www.w3schools.com/googlesheets/>
4. <https://www.smartsheet.com/how-create-dashboard-excel>

Pedagogy:

Demo by e-Contents

Course Designer:

Ms.N.Agalya

Semester II	Internal Marks:25		External Marks:75	
COURSE CODE	COURSE TITLE	CATEGORY	HOURS/WEEK	CREDITS
22UCS2AC3/ 22UCG2AC3/ 22UCA2AC3/ 22UIT2AC3	OPERATIONS RESEARCH	ALLIED	4	3

Course Objective

- **Understand** the various features of Operations research.
- **Analyze** the optimum solutions using Operations research.
- **Explore** the concepts of Operations research in real life problems.

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Define the various techniques of Operations research.	K1
CO2	Illustrate the various notions in the respective streams.	K2
CO3	Identify the different terminologies of Operations research	K3
CO4	Analyze the solutions of mathematical problem using specific techniques.	K4
CO5	Simplify the optimum solutions of a mathematical problem.	K4

Mapping of CO with PO and PSO

CO s	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO 5
CO1	3	2	3	3	2	3	3	3	2	3
CO2	3	2	3	3	2	3	3	3	3	2
CO3	3	2	3	3	2	3	2	3	2	2
CO4	3	2	2	2	2	3	3	2	3	2
CO5	3	2	3	2	2	3	3	3	2	2

“1” – Slight (Low) Correlation “2” – Moderate (Medium) Correlation
“3” – Substantial (High) Correlation “-” indicates there is no correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	Operations Research Introduction-Origin and Development of O.R.- Nature and Features of O.R.- Scientific Method in O.R.-Modelling in Operations Research - Advantage and Limitation of Models-General Solution Methods for O.R. Models- Methodology of Operations Research- Operations Research and Decision Making Linear Programming Problem- Mathematical Formulation Introduction-Linear programming Problem-Mathematical Formulation of the problem -Illustrations on Mathematical Formulation of LPPs.(simple problems only) Linear programming problem-Graphical Solution and Extension Introduction- Graphical Solution Method- General Linear Programming Problem- Canonical and Standard Forms of LPP.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
II	Linear Programming Problem-Simplex Method Introduction-Fundamental Properties of Solutions-The computational Procedure- The Simplex Algorithm-Use of Artificial Variables-Big Method (simple problems only).	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
III	Transportation problem Introduction-LP Formulation of the Transportation Problem- Existence of Solution in T.P-The Transportation Table-Loops in Transportation Table-Solution of a Transportation Problem-Finding an Initial Basic Feasible Solution-Test for Optimality- Economic interpretation of u_j 's and v_j 's - Degeneracy in Transportation Problem-Transportation Algorithm (MODI method), (simple problems only). Assignment Problem Introduction-Mathematical Formulation of the Problem- Solution Methods of Assignment Problem-Special Cases in Assignment Problems (simple problems only).	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
IV	Sequencing problem Introduction-Problem of Sequencing-Basic Terms Used in Sequencing- Processing n Jobs through Two Machines- Processing n Jobs through k Machines (problems only).	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
V	Network Scheduling by PERT/CPM Introduction- Network: Basic Components- Logical Sequencing- Rules of Network Construction-Concurrent Activities - Critical Path Analysis -	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

	Probability Considerations in PERT.			
VI	Self-Study for Enrichment (Not included for End Semester Examination) Application of Operations Research. – Two-Phase method – The Travelling Salesman problem – Processing 2 Jobs through k Machines – Inventory Models (without shortage)	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

Text Books

1. Kanti Swarup, P.K. Gupta, Manmohan (2019). *Operations research*, Sultan Chand Publications.

Chapters and Sections

- UNIT-I Chapter 1: Sections 1:1 – 1:9
 Chapter 2: Sections 2:1 – 2:4
 Chapter 3: Sections 3:1 – 3:5
- UNIT II Chapter 4: Sections 4:1 – 4:4
- UNIT-III Chapter 10: Sections 10:1 – 10:3, 10:5, 10:6, 10:8 – 10:13
 Chapter 11: Sections 11:1 – 11:4
- UNIT-IV Chapter 12: Sections 12:1 – 12:5
- UNIT-V Chapter 25: Sections 25:1 – 25:7

Reference Books

1. Hamdy A.Taha (2017), *Operations Research An Introduction*, Pearson India Education services PVT Ltd.
2. Premkumar Gupta, Hira D.S.(2004), *Operations Research*, S.Chand & Company Ltd, New Delhi.
3. Chandrasekhara Rao.K, Shanti Lata Mishra(2008), *Operations Research*, Narosa Publishing House PVT Ltd, New Delhi.

Web References

1. <https://www.britannica.com/topic/operations-research>
2. <https://byjus.com/maths/linear-programming/>
3. <https://www.gatexplore.com/transportation-problem-study-notes/>
4. <https://youtu.be/rowWM-MijXU>
5. <https://youtu.be/TQvxWaQnrqI>
6. https://youtu.be/RTX-ik_8i-k
7. <https://youtu.be/s5KZw1EpBEo>

Pedagogy

Power point presentation, Group discussion, Seminar, Assignment.

Course Designers

1. Dr. V. Geetha
2. Dr. S. Sasikala